Mr Newton in his Princ.
Math. Says that the Earth is
at the Equator higher
at the Equator then at the
Poles, for how little soever
a Globe differs from the
Spherical figure, the lines
drawn from the Center
to the Circumference are
no longer equal.

He Says the Diameter of the
Equator is to the Axis of the
Earth as 692 to 689, whence
follows that the said Axis
being 3923 miles 800 foot
according to the Calculation of
Mr Picard a French Mathe-
matician the hight of the
Earth at the Equator sur-
passes its height at the

Poles 17 miles & 200 foot.
allowing 5000 foot to a
mile. By all which it appears
that the Terrestrial Globe is not
perfectly round but some-
what ovall and more ex-
tended in length East &
West-wards then towards
the Poles, so that the Equi-
noctial or the longest circular
line of this Globe, and
the Polar Axis is the
shortest Diameter. And
Mr Huygens in his Book of
Gravity calculates this
difference to be 17 miles
on each side, see De La
Cros mancirq for the Ingenious
page 8. 9.

Since not only Mr Newton
but divers others admit the
principle of the inequality
of Diameters in this Terra-
queous Globe it rationally
follows, that not our Earth
a little higher under the
Equator than under the
Poles, the Seas would
subside towards the
Poles, and ascending
along the Equator would
overflow all.

Some may find fault for
calling the Point of the longest
Diameter of our Globe East
& West. it is true there are
3 Diameters in a Globe

whereas But 2 can be imprinted in a Planisphere whose 4 Cardinall Points wt we do call North & South. E. & W. but at last it comes all to one provided the Earth be sit upright on its longest Diameter. See Dela Croix Memoirs page 112. 113. 206. 287. 171

Cassini & Flamstead agree in this, that the Diameter of Jupiter is observed to be shorter betwixt the Poles then

from East to West: which
is a proof of Mr Newtons
Proposition. viz. that the
Axis of the Planets are
shorter than the Diameters
that are drawn upon
them, in the following
manner, had not the
planets a Diurnal motion
as their parts fay ignally
heavy upon one another
they would be perfectly
Spherical; but this circular
motion causes the said
parts to remove from the
Axis, and to tend upwards
to the Equator, and therefore
if matter be fluid, it will
increase the Diameters

of the Equator by its assent and diminish the Axis of the Poles: for wch Newtons Principia Mathematica 3 Book the 17th Theorem, wch quoted by mr De la Caze memoires pag. 286:

If you let fall a stone at the height of 25 fathoms and it runs thro that space in 5 seconds of time, it will pass thro the 1 fathom in the 1 second, thro the 4 in the 2 second, thro the 9 in the 3, thro the 16 in the 4. and thro all the 25 in 5. according to the

Argumts that the Earth is ỳ Center.

Why a man standing in any part of the Horizon six of the Signs of the Zodiak will be seen of him, and ỳ other 6 alwaies hid, but ỳ ỳ Earth is exactly and at all times in ỳ midst of ỳ world, or of ỳ circumference of ỳ Heavens, or what is ỳ reason, why the Moon never happens to be eclipsed, but when she is opposite to ỳ Sun but because the Earth is precisely in ỳ midst of the world.

2. If ỳ Earth moves according to the Cartesians, it must have contrary and different motions at the same time as a Diurnall motion upon its owne axis, an annuall motion thro the 12 Signs

Dyſtich concerning the Initiation of ASTRONOMIA CRYSTALLINA.

WHen Pride in ſome *Copernicans*
Had rais'd a ſcornful *Square*,
They thought no Men in all the World
With them fit to compare:
When they their Neighbours did deſpiſe,
And did their Friends diſdain;
Counting themſelves the only Wiſe,
Beyond all common ſtrain:
When with *inſulting Language*, they
Did proudly brag and boaſt;
As if that they, and none but they,
Could *view* the *Heavenly Hoſt*:
Then *CRYSTALLINA* was *Conceiv'd*,
And quickly *brought to Birth*,
To ſhew the *Motions* in the *Heavens*,
And *turning* of the *Earth*;
And to Convince *COPERNICANS*,
Whom Pride had puft ſo high,
That *in Conceipt* above all Men
They to the *Moon* could flie:
And to *confute* their *Errours* great,
Which they made *ſome* believe;
Then *CRYSTALLINA* was *put forth*,
The WORLD to *undeceive*.

The Poſtſcript.

When Zoilus *and* Momus, Cryſtallina *did view*,
Quoth Robert *to* Thomas, *though this be all true*,
We muſt contradict *it*, *or elſe 'twill* ſpoil *you*,

And all our long Labours *for ſo many years:*
This little ſmall Pamphlet *puts me in great fears*;
We ſhall come off courſely, *and People will jear's.*

Quoth Thomas, *It is true, we cannot deny it*;
And 'tis of ſmall price too, and many *will buy it*;
Our only Courſe therefore will be to belye *it.*

'Tis ſuch Maſſie Matter *that we cannot turn it*,
I wiſh we could perſwade the Author *to burn it*,
That no Man hereafter might ever diſcern it:

For if it continues, and be not put aſide,
It will ſo much convince, both our Boaſtings *and* Pride,
That thoſe which once lov'd *us, now will us deride.*

why may not the Sun move
as Tycho supposes and y Planets
move about it, whilst y Earth
stands still and by magnetism
attracts y Sun, and so keeps him
moving about it: it is true Tycho
& Riccoli deny any Parallax of
y Orb of y Earth. so that the
controversy according to Mr Hooke
remained undetermined till Anno
1674, which he endeavours to prove
the certainty of y Copernican Sys-
teme by the observations he made
in July & October that there
is a sensible Parallax of y Earths
Orb by y fixt Star in the
Head of Draco and consequently
a confirmation of the Copir-
nican System against the Ptolomaick & Tichonick, which he
published in a Treatise Entituled
An attempt to prove the motion
of y Earth: printed 1674: as about
that time he says whether
y Earth move about the Sun or
the Sun about the Earth, the Argu-
ments are still at best probabilities
on this or that side. so we are

and a motion of declination
quite contrary to that upon the
Center. Absurdity which in
the motion of the Heavens are
salved by the supposition of
Epicycles or lesser Orbs mov-
ing within ye compasse of the
greater, just as a fly upon a
Wheele may be supposed to be
whirled about with ye wheele
from East to West and yet at
the same time crep slowly
on quite contrary to the motion
of the Wheele by a peculiar
motion of it owne. Those
Demonstracons wch are produced
to prove the contrary are
no Demonstracons but proba-
ble Fancies as they themselves
confesse.

I am not of the opinion of the
Author of this Booke that there
would be no Tides if ye Earth
did not move round in 24 hours

for I am of opinion (& shall
be glad to be convinced) that the
Water is naturally apt to move
and by spirituall running
whire it hath a convenient

channell wherein to flow and
whereby to imply it self into an
other place, for most Cosmo-

LICENCED,

graphers hold that if it were

According to Order.

July, 5.
1670.

certaine that there were a
channell at the North for y^e
water of Mare del Zure or

ye westerne Ocean, to passe into
the Atlantick, as there is at the
South for the Waters of the At-
lantick to passe into Mare del
Zure, I should think that the
tide in the narrow Seas
creeks and Rivers nigh the

ASTRONOMIA CRYSTALLINA:

OR,

A New and Clear Way

To *know* and *behold* all the

HEAVENLY MOTIONS

PLAINLY,

As through a *Cryſtal Glaſs.*

Far more Eaſie and Perſpicuous, than any before Extant.

Compoſed according to the beſt Obſervations, and moſt rational *Grounds* of *ART.*

By *J. H.* a Lover of Truth and *Mathematical* Demonſtrations.

Pſalm. XIX. 1.

The Heavens declare the Glory of God, and the Firmament ſheweth his handy-work.

London, Printed for the Author, 1670.

Sea (for in the main Ocean there is little tide. Objected) were nothing else but an Effect of that great Flood by which the waters of one Hemisphere do continually flow into an other, according to the course and motion of the Superior World, wch Flood filleth all narrow Seas Creeks &c. and that the Ebb is nothing else but the recess of the Sea and Water retiring & withdrawing themselves to follow that great Flood when it is gon by.

To the Readers.

Courteous Readers,

I *Having obſerved the many Conteſts and Contradictions that have been among Authors, both Ancient and Modern, concerning the* Heavenly Motions, *ſome declaring, that the Earth was the Center, and that the whole Frame of the Heavens did run whirling about it in Twenty four hours: Others reproving of this, and ſaying, that the Sun was the Center, and that the Earth did run whirling about the Sun: Both which, in my judgement, ſeemed very abſurd; I therefore took a diligent view of the ſeveral Syſtems, and finding as great abſurdities in the latter as in*

the former, or rather more: I considered how the Appearances might be solved another way, without either the Frame of the Heavens whirling round about the Earth, or the Earth whirling round about the Sun; but by as much quietness and stillness of both the Heavens and the Earth, as can be imagined: The Eternal Creator of all these things, having put this knowledge into my Mind, I thought it my duty not to hide my Talent, but to declare the same unto you my Countrey-men and Fellow Creatures thoroughout the World, that we may be the better able to praise and glorifie God, the Eternal Maker, and continual Preserver of all these things. Which is the chiefest desire of

Your Affectionate
&
Plain-dealing Friend,
J. H.

Aſtronomia Cryſtallina :

Or,

A New and Clear Way to know and behold all the HEAVENLY MOTIONS plainly, as through a *Cryſtal Glaſs.*

IN the firſt place I ſhall begin with *Ptolomy*, and his Followers, who according to vulgar appearances, imagined the Earth to be as ſtill as a Stock or Stone lying upon it, and the whole Frame of the Heavens to run whirling about it with a monſtrous ſwift pace, as the holders of this Opinion tell us, that every Star in the *Æquator* goeth in one

hour 4529538 *German* Miles; another of the ſame Opinion, tells us, that the pulſe of a well tempered Man doth beat 4000 times in an hour, and in the time of beating one pulſe every Star in the *Æquator* muſt move 1132 *German* Miles. Another Author tells us, that according to common grounds, every Star in the *Æquator* muſt move 42398437½ Miles in an hour: Yet *Ptolomy*, in his Syſtem, did imagine other Heavens above and beyond the Starry Heaven, as a Cryſtalline Heaven, and a *Primum Mobile*, or firſt Mover, which were imagined to move far ſwifter than the Stars.

Theſe monſtrous incredible Stories have ſtumbled many, that otherwiſe would have been clearly of the ſame judgment, becauſe vulgar appearances do agree with the ſame Opinion, and alſo divers Texts of Scripture in the Bible do literally conſent thereunto: But vulgar appearances are deceitful, and the Scriptures are not always to have a litteral interpretation, as hath been proved very largely by ſeveral able Authors, in divers Book; whereof more hereafter, but I deſire to be brief.

Although *Ptolomy* imagined all thoſe great whirlings of the Heavens, yet he could not find, nor imagine by what means the Planets did move ſometimes forwards, and ſometimes backwards, and ſometimes to ſtand ſtill; but by imagining abundance of Epicycles, and ſuch kind of ridiculous Wheel-works in the Heavens: Whereas, in truth, there are no ſuch things,

things, but only every Planet hath his ſingle Orb or Line to move in; yet they ſeem ſometimes to go backwards, and ſometimes to ſtand ſtill; albeit they never at all go otherwiſe, but only forward; as ſhall be proved in due place and time.

This Opinion of *Ptolomy* held in the World a long time, through many Ages and Generations, and was upheld ſtrictly by the Church of *Rome*; and, as Authors ſay, divers Men were ſorely puniſhed for queſtioning of it, becauſe they did not believe as the Church believed: But at length *Copernicus* adventured to reprove this Opinion, declaring, that he had found out a way, how the Planets might move every one in a ſingle Line round about the Sun, and although they go only forward, yet they might ſeem to us to go backward, and ſometimes to ſtand ſtill.

But this he could not conceive any way, but by imagining, that the Earth muſt be carried by a great whirling pace round about the Sun; and as Mr. *Wing* ſaith, in his Almanack 1669. *That the Earth is transferred in a day* 86418 *Miles, and in an hour* 3600 *Miles, and in a Minute* 60 *Miles about the Sun.*

And yet the *Copernicans* would perſwade the World, that we cannot perceive any Motion at all; but this is as falſe and abſurd, as the former Opinion of *Ptolomy*, and in ſome caſes worſe.

For firſt, With God all things are poſſible, though

though with Men impoſſible to know; and therefore it is poſſible (though very unlikely) that the Heavens may run about the Earth in four and twenty hours, and the Earth to be ſtill; and if ſo, we may ſee the Pole Star in a conſtant place, and by it find and know, the the certain Latitude both at Sea and Land, as we may, and do now.

But if the Earth were carried round about the Sun, at ſuch a diſtance as ſome *Copernicans* have ſaid, *viz.* 13755 Semidiameters of the Earth from the Sun, I ſay, that certainly if we, who dwell upon the Earth, ſhould be carried with the Earth, ſometimes 13755 Semidiameters Eaſtward, and another time 13755 Semidiameters Weſtward; and ſometimes to be elevated 13755 Semidiameters above the Sun, and ſometimes depreſſed 13755 Semidiameters below the Sun: I ſay, if it were poſſible, that we might not feel the motion (which is very unlikely) yet we muſt ſee our ſelves to be moved by the Pole Star, which without all queſtion would not keep the ſame Elevation with the Earth, as now it conſtantly doth, if the Earth were ſo carried about, as is aforeſaid by the *Copernicans*, but this is impoſſible: For then we muſt undoubtedly loſe the uſe of the Pole Star for the Latitude, and then the Latitude would be as uncertain as the Longitude; whereas now all Artiſts know, that a Man may, in all habitable parts of the World, know in what Latitude he is by a ſmall Inſtrument, which a Man

Man may carry in his Pocket; and if he pass by Land 60 *English* Miles, or 20 *German* Miles, toward the North, he may find the Pole Star to be one degree higher; and if he pass twice so far, he may perceive the Pole Star to be two degrees higher; and so every 60 *English* Miles, or every 20 *German* Miles, will alter a degree in Latitude more.

But if the Earth should be carried up and down, according to this *Copernican* Rate, it would be impossible to have any certainty of the Latitude.

But all that they have to say, in excuse of this great absurd Errour, is this, That no Man can know how far the Starry Heaven is from us. But this is but a poor shift: For many *Astronomers*, both ancient and modern Writers, have declared both the distance and bigness of the Fixed Stars, with whom, the *Copernicans* do comply sufficiently in all other things: But because this touches their Copy-hold, therefore they do not love to hear of it. They themselves will tell you how far it is to the Orb of every Planet, but of the distance of the Starry Heaven they will not declare, because it will utterly overthrow their former Works, some of the which are very large.

But if they will believe *Albategnus*, he tells them, that to the Starry Heaven from the Earth it is 19000 Semidiameters of the Earth.

And *Tycho Brahe*, a diligent Observator, as divers *Copernicans* report of him, he saith, that the

the diſtance is leſs than that of *Albategnus* by 5000 Semidiameters, that is to ſay, 14000 Semidiameters of the Earth to the Starry Heaven; the leaſt of theſe diſtances is a very great ſpace, for every ſingle Semidiameter is 3436 Miles: But yet, although the *Copernicans* ſay, that theſe Men were skillful, and careful, and diligent Obſervators, yet in this Point they cannot pleaſe them. The truth is, nothing in this kind will pleaſe them, but either Infiniteneſs or Ignorance.

For ſeeing themſelves to be run into ſuch a great Errour, they ſeek to perſwade us, that the diſtance of the Stars from the Earth is infinite, or elſe ſo great that no Man can know; and ſo caſt off the Opinions of thoſe learned Men, which have declared their diſtance to be finite.

For, indeed, if they ſhould grant either of thoſe diſtances before-mentioned to be true, or near the truth, they would be utterly caſt concerning that Opinion of the Earths going round about the Sun, as may eaſily be demonſtrated thus:

Take two ſticks that are ſtraight, each of them 14 Inches long, reſembling 14000 Semidiameters, according to *Tycho*; or two ſticks 19 Inches long, according to *Albategnus* his 19000 Semidiameters, and lay one of thoſe couple of ſticks upon a Table, and lay them ſo that they may touch together at the upper ends, and ſpread them at the lower ends until they be 3 Inches $\frac{1}{4}$ aſunder at the bottom, that is according

cording to the *Copernicans* ſuppoſed Orb of the Earth, twice 13755 Semidiameters, and then tell me whether that Angle at the top of the ſticks will be perceptable or not; I ſuppoſe it will, for it will be very large; and therefore the *Copernicans* had need to plead for a large diſtance from us to the Stars.

Having now declared the abſurd Errours of both the former Opinions, *viz. Ptolomy*, who deluded himſelf and the World with his Doctrine, thorough ſo many Ages and Generations before *Copernicus*; and *Copernicus*, who reproved him for a great Errour, and in the mean while did ſeek to delude the World with a greater Errour himſelf, as hath been before declared and ſufficiently confuted.

Now, according to my promiſe, I intend to declare, how all the Appearances aforeſaid may be (and without all queſtion are) performed without the whirling of the whole Frame of the Heavens about the Earth in 24 hours, or the Earth whirling round about the Sun, as aforeſaid.

But before I come to that, I judge it needful to anſwer ſome ſeeming Objections that may be made from Scripture, concerning the Eſtabliſhing of the World, both the Earth and Heavens; as *Pſalm* 93. 1. *The World alſo is eſtabliſhed, that it cannot be moved.* & *Pſalm* 96. 10. *The World alſo ſhall be eſtabliſhed, that it ſhall not be moved.* This is meant of the whole Frame of the World, both Heavens and Earth, as is plain

plain in *Proverbs* 3. 19. *The Lord by Wisdom hath founded the Earth, by Understanding hath he established the Heavens.* Many more places might be cited, but in brief let these suffice, because they have been all sufficiently answered by other able Authors, and I desire to be brief; and therefore take notice, that the *Psalmist* declareth, that the whole World is established, both the Heavens and the Earth; and *Solomon* declareth more particularly, that the Earth is founded, and the Heavens are established; than what can be more firmly declared. Yet we are not from hence to deny our own daily experience: for if we should conclude, that they, both Heavens and Earth, are so settled, as no Motion at all to be in either of them, we must then deny that we see Day and Night, Winter and Summer; and therefore although the Scripture doth declare unto us, that all the World, both the Heavens and the Earth, be firmly fixed, founded, and established, yet we must take it in such sense as is agreeable to what we see, and so we may in this Case very well; for by those expressions is plainly meant, that if all the Creatures in the World should joyn all their forces together, they could not alter the Work that God hath established. But we cannot deny, but that there is a turning round of either the Heavens or the Earth every 24 hours, although both be firmly established.

In brief, I take it to be thus, The Earth is established in this manner, as a Work-man that

intends

intends to turn a Globe, or any ſuch round thing in a Laeth, he muſt firſt fix it ſo firmly, that it may not move toward the right nor left hand, nor toward nor fromward, nor upward nor downward, ſo much as one hairs breadth (if he will make good work of it) and then a Man may well ſay, that it is firmly fixed; but yet there is liberty to turn round, or elſe he cannot make any work with it at all.

In the ſame manner we conceive the Earth to be fixed between the two immoveable Poles of the Heavens, that is, the North and South Poles, and ſo to turn about, according to the manner of an artificial Globe, in 24 hours gently and ſmoothly; which may very well be, and yet we that dwell upon the Earth not perceive it, eſpecially in theſe Northern Parts wherein we live; for although at the *Æquator* the ſuperficies of the Earth doth turn 900 Miles in an hour, yet in our Climate we turn not ſo ſwiftly by half; and this I ſuppoſe to be the cauſe why our Countrey-men, when they come firſt into thoſe parts near the *Æquator*, at Sea, they are many of them troubled with a Diſeaſe called the *Calenture*, which makes them as it were Lunatick, and to think the Sea to be a green field, and if they be not looked to, they will run into the Sea. This I conceive is chiefly cauſed by the turning of the Earth more ſwiftly there than where they were born. But after they have been a while uſed to it, it is more natural to them, and then they are well again.

Another

Another obſervable thing, in thoſe Parts about the *Æquator*, Travellers report, that there is conſtantly an Eaſterly Wind, and the Sea conſtantly flowing Weſtward; which argues, that the ſwiftneſs of the Earths Motion doth meet the Air, and ſo cauſeth a breeſing Wind, and alſo doth cauſe the Water (it being liquid) to ſeem to run Weſtard, becauſe it doth not keep pace with the Earth, which turneth Eaſtward.

But in theſe Parts of the Earth, wherein we dwell, we ſee not the like, neither in the Air nor Water; yet it is obſervable in theſe Parts of the Earth, that where a River runneth Eaſtwardly, there the Tides flow fartheſt into the Land; and that is an Argument that the Earth doth turn Eaſtward.

Another Argument, for this quiet and convenient Motion of the Earth, may be drawn from the Waters, which, while they be within the bowels of the Earth, they are as it were ſwinged by the turning of the Earth up to the tops of the higheſt hills, and there, or near to the high hills tops, they break out, and are the moſt fluent Springs of Water that are; and affoon as they are out of the Earth in the open Air, they preſently run downwards towards the Earths Center with all poſſible ſpeed.

You may eaſily try an Experiment of this your ſelves: Take a quart pot, or the like, and fill it half full of Water, and you may ſwing it about or over your head, or which way you will,

will, and ſo long as you keep it ſwinging there will not any drop of Water fall out at the mouth; but if there be but a pin-hole in the bottom, it will freely fly out there, upward as well as downward, and a gentle ſwinging in that manner will make a ſmall wind, ſuch as is reported to be about the *Æquator*, as aforeſaid.

Another Argument, for this quiet, eaſie, and natural Motion of the Earth, may be drawn from the inclination that all natural Creatures that live upon the Earth have unto ſleep; which inclination, by experience, we know may be augmented by ſwinging and rocking of Children, or the like, and without queſtion it is begun and maintained by the ſame, I mean, by the eaſie turning of the Earth.

Another Argument, for this quiet natural Motion of the Earth, may be taken from the Condition of Men that are not uſed to climbing high, who at firſt, if they aſcend up an high Ladder, or to the top of an high Houſe or Steeple, their heads will ſwime, but after by uſe it grows more natural to them, and then they can endure it better: This, queſtionleſs, is alſo cauſed by the eaſie turning of the Earth.

Having thus ſhewed you, the neceſſarineſs, yea I may ſay the neceſſity of the Earths diurnal Motion; for by it we enjoy Day and Night, Sleep and Reſt, Water in the higheſt Hills, and many other Bleſſings, which we might want if it were not ſo.

Now I come to ſhew you the annual Motion of the Sun, whereby we enjoy Summer and Winter, Light and Heat, and many other Bleſſings of that kind, and not only we that dwell upon this little Globe of Earth, but alſo all the Planets and Bodies which are within our Syſteme, not as *Ptolomy* declared, by running and whirling round about the Earth every 24 hours, nor yet as *Copernicus* taught, that the Sun ſhould ſtand ſtill, and the Earth to run whirling about the Sun; but by a gentle ſober Motion, the Sun goeth from one Sign to another, as from the firſt Degree of *Aries* unto *Taurus* in one Month, and thorough *Taurus* to *Gemini* in another Month, and thorough *Gemini* to *Cancer* in another Month, and ſo in twelve Months he paſſeth thorough all the twelve Signs of the *Zodiack* quite round the Heavens and the Earth, and ſo in a Year he warmeth, enlightneth, and comforteth all.

The *Zodiack* which containeth the twelve Signs, is a great Circle that runneth oblique, or byas to the *Æquator*, and croſſeth the *Æquator* in two places, *viz.* at *Aries* and *Libra*, in both which places it maketh equal Day and Night; and in going up from *Aries* to *Cancer*, it maketh our Summer and longeſt Days, in ſo much that it ſhineth quite over the top of the Earth near the North Pole, as at *Greenland*, and maketh all Day and no Night there until it is gone down to *Libra*, and then it beginneth to be dark under the North Pole and light under the South

South Pole, and when it is gone down to *Capricorn* our Days, on this North ſide of the *Æquator*, will be at the ſhorteſt, and the Sun will ſhine quite beyond the Earth under the South Pole, and ſo make all Day and no Night there.

Having thus plainly ſhewed you the Motions of both the Earth and Sun, the Cauſe of Day and Night, and Summer and Winter; now I come to ſhew you how the five Stars, called Planets are moved; which, although they go always forwards, every one in a ſingle Orb or Line, going from Weſt to Eaſt according to the ſucceſſion of the Signs, that is from *Aries* to *Taurus*, and from *Taurus* to *Gemini*, *&c.* round about the Sun; and the three Superiours, *Mars*, *Jupiter* and *Saturn*, go round about the Earth alſo.

This is plainly demonſtrated by the two Diagrams at the end of the Book: The Diagrams are one bigger, and the other leſſer; the bigger being a whole Circumference, the leſſer but little more than half a Circle.

The greater containing, firſt the Earth in the Center, next the Moon in her Orb, thorough which ſhe goeth round about the Earth every Month, but never about the Sun, but only about the Earth, like as the two Inferiour Planets *Mercury* and *Venus* go only about the Sun, and not about the Earth, ſo the Moon goeth near to the Earth, and not at all about the Sun; the next Orb without that Orb of the Moon, is

the Orb of the Sun, thorough which he paſſeth every Year; from the ſaid Orb of the Sun are twelve Lines to the twelve Signs in the Starry Heaven, there is alſo another Right Line from *Gemini* to *Aquarius*, which Line is parallel to the Lines of *Cancer* and *Capricorn*, of which more hereafter.

The leſſer Diagram, as aforeſaid, is but little more than half a Circle, becauſe if made in Paper (which is not ſo good as Glaſs or tranſparent Horn) it would hide too much of the bigger Diagram when it is laid upon it; and therefore you are to imagine the three Orbs of the three Superiour Planets *Saturn*, *Jupiter* and *Mars* to be wholly round, as well as thoſe two Orbs of the two Inferiour Planets *Mercury* and *Venus*; for, as you ſee in this leſſer Diagram, they are all placed about the Sun, and the Sun is Center to all their Orbs, and they all keep their diſtance from the Sun, as you may ſee here in this leſſer Diagram: Firſt, *Mercury* is next to the Sun, and next without that *Venus*; and you are to obſerve, that theſe two Inferiour Planets never go round about the Earth, but as they go with the Sun; but the three Superiour Planets *Mars*, *Jupiter* and *Saturn*, do go round both about the Sun and the Earth alſo, as you may eaſily perceive when the two Diagrams are fixed and laid one upon the other: In this leſſer Diagram you have the Sun, Center to all thoſe five Planets; *Mercury* you may ſee hath but a ſmall Orb, and therefore he goeth the ſooner

thorough

thorough it, *viz.* in 88 days; the Orb of *Venus* as you may ſee is ſomewhat bigger, and therefore ſhe is longer in going round thorough it, *viz.* 225 days; the Orb of *Mars* you may ſee is much greater than either of the former two, and therefore he is longer than either of them two in going round thorough his Circle, *viz.* 2 years; the Orb of *Jupiter* you ſee is greater than the Orb of *Mars*, and therefore he is longer before he can go round thorough it, *viz.* 12 years; and laſtly, the Orb of *Saturn* is bigger than any of the reſt, and therefore he is longeſt of all in going round thorough his Circle, that is to ſay, 30 years.

You are alſo to obſerve, that in the leſſer Diagram there is a Diameter Line which paſſeth from North to South, that is, from N to S; the which Line, in ſliding the leſſer Diagram upon the greater, is always to be kept parallel with the two parallel Lines in the greater Diagram aforeſaid, the one of them going from *Gemini* to *Aquarius*, and the other from *Cancer* to *Capricorn*.

The two Diagrams being thus made and fitted, the beſt way and means to ſlide the leſſer upon the greater, as aforeſaid, is to draw a Thread thorough the two Centers, and thereby to give the Sun juſt ſo much length as that he may go round the Earth upon his own Orb deſcribed in the bigger Diagram, and then you may plainly ſee how the Sun doth go round the Earth once in every year, and carrieth with him the five Pla-

nets

nets in their Orbs as in a Frame: (And much according to the ſame manner doth *Jupiter* carry with himſelf his four Satellities or little Stars, which move about him, and keep their ſeveral diſtances as the Planets do about the Sun.)

The leſſer Diagram being ſo made and fixed upon the greater, firſt ſet the ſide that is ſtraight parallel to the parallel Line *Gemini* and *Aquarius*, and then ſet the Sun upon his own Orb at the Line of *Aries*, then ſlide the leſſer Diagram gently towards *Taurus* (ſtill keeping the Lines parallel) and if a Planet be, as you may ſee, at N, that Planet ſo placed, will ſeem at the firſt moving of the Sun to be ſtationary, but before the Sun hath paſſed half way towards *Taurus*, you may plainly ſee the Planet in that place to go direct, that is, toward *Cancer*: But, in the mean time, a Planet at S will go retrograde, that is, backward from *Aquarius* towards *Capricorn*; and ſo a Planet at S will go backward, and a Planet at N will go forward, until the Sun hath paſſed almoſt to *Libra*, but after the Sun hath paſſed *Libra*, you may ſoon ſee that the Planets will change their goings, and then the Planet at N will begin to go backward in appearance, and then the Planet at S will go forward, and ſo will continue until the Sun hath paſſed almoſt to *Aries* agen: But you are to conſider, that all this while the Planets go on by little and little in their own Orbs, for while the Sun moveth from *Aries* round about to *Aries* agen, that is, in a year, *Mars* in that time will be

be moved in his Orb from N to S, for in two years he goeth round quite thorough his Orb; and *Jupiter* in the ſame ſpace of time, will be moved a ſixth part of the Semicircle from N toward S, for in twelve years he will go quite round; and *Saturn* will be moved in the like time, but a fifteenth part of his Semicircle from N toward S, becauſe he will be thirty years in going round and thorough his Orb or Circle, and therefore he will be retrograde longeſt of all. You may alſo obſerve, that by the going of the Sun round about the Earth, and being always in the midſt of the Orbs of the Planets, he ſwayeth the three Superiour Planets much nearer to the Earth at ſome times than at other times, and that is the Cauſe why *Mars* (which is the neareſt of the three) doth ſhow ſo abundantly bigger at ſome times than at other times, for the Sun ſwayeth the Orb of *Mars* nearer to the Earth than the Orb of the Sun it ſelf, as you may plainly ſee by the ſliding of the Diagram.

Thus have I briefly and plainly deſcribed unto you the ways and means, by which all the Heavenly Motions, in all probability, are performed, whereby we may ſee the great, excellent, and moſt unſpeakable Power and Wiſdom of God, the Eternal Maker, Ruler, and Preſerver of all, who alſo hath given to Man, and to Man only among all his Creatures, Knowledge to behold and admire his great and wonderful Works, and to praiſe and glorifie

glorifie his great and holy Name: To whom be aſcribed all Praiſe, Honour, and Glory, thoroughout all Ages and Generations, World without End, *Amen.*

FINIS.

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